^{210}Pb AND ^{210}Po DETERMINATION IN ENVIRONMENTAL SAMPLES USING LIQUID SCINTILLATION COUNTING AND ALPHA SPECTROMETRY

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A simple radiochemical procedure has been developed to determine ^{210}Pb and ^{210}Po in environmental samples. After adding ^{209}Po tracer and Pb carrier, an aliquot of the sample is decomposed by microwave digestion or by evaporation with mineral acids (depending on the expected activity of the sample). Part of the leaching solution must be used for ^{210}Po determination, preparing a polonium source by spontaneous deposition onto a nickel disk. The quantitative recoveries are determined using a standard ^{209}Po tracer, and the activity concentration is determined by isotopic dilution alpha spectrometry. The remaining part of the leaching solution is used for ^{210}Pb determination by means of two alternative methods: lead can be retained from 1.5 M HCl by the DOWEX 1 X 8, Cl^- form resin in a chromatographic column, and stripped with deionised water, or it can be separated by solvent extraction as a lead bromide complex with the organic compound ALIQUAT-336® in toluene (this second method is used preferably in water samples). The Pb source for measurement is prepared by precipitation as oxalate and the chemical recovery determined by gravimetry. The activity concentration of ^{210}Pb is calculated from the spectra measured with a liquid scintillation spectrometer.

Several certified material samples supplied by IAEA were analysed to check the procedure. The measured values for ^{210}Pb and ^{210}Po were in good agreement with the certified values presenting deviations lower than 5%. Several environmental samples (river and well waters and also sediments) from zones impacted by Uranium mine exploitation were analysed using the described procedure. The mean yields of Pb and Po were (70 $\pm$ 10)% and (81 $\pm$ 7)% for waters and (70 $\pm$ 12)% and (77 $\pm$ 8)% for sediments.